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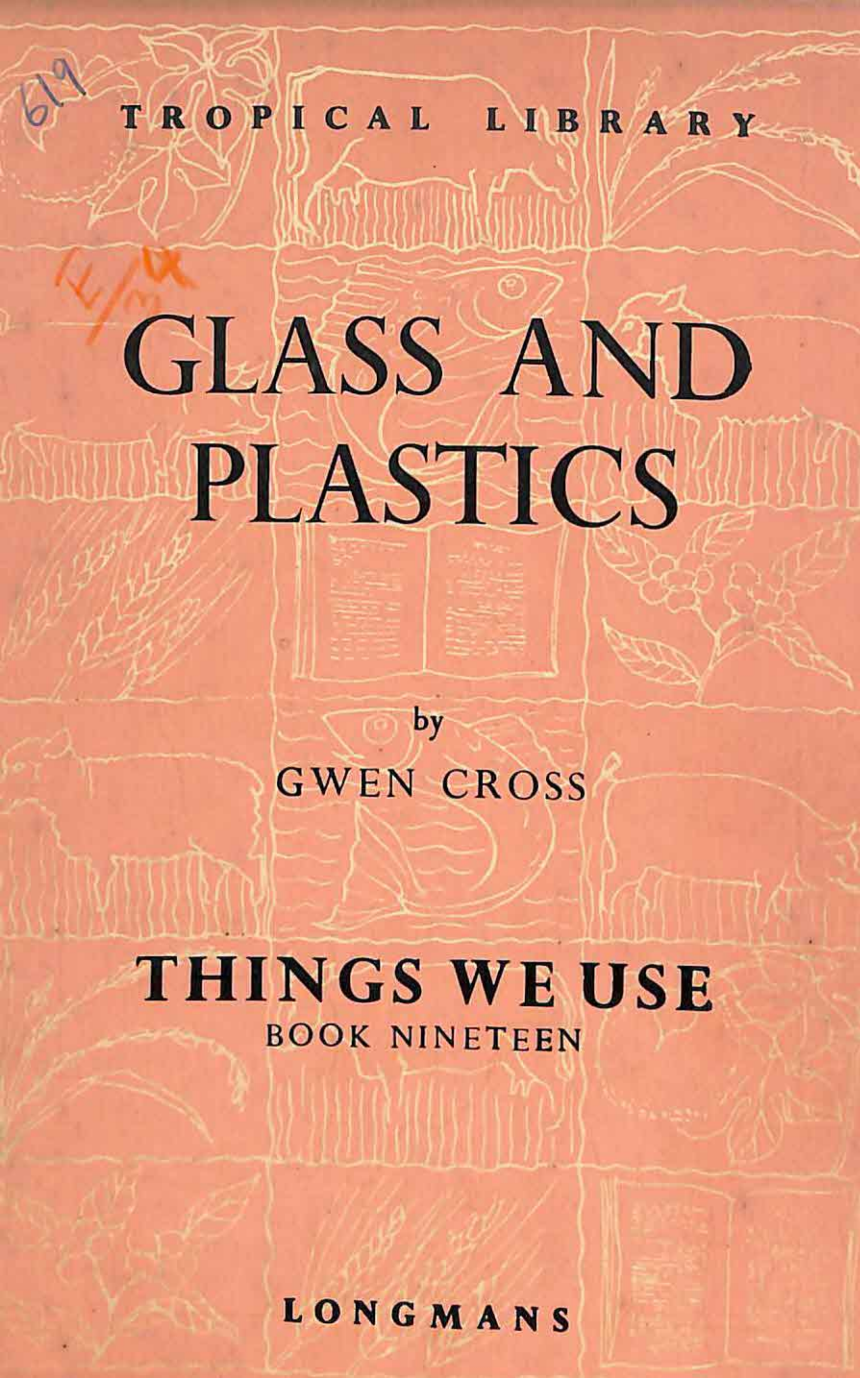

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GLASS AND PLASTICS

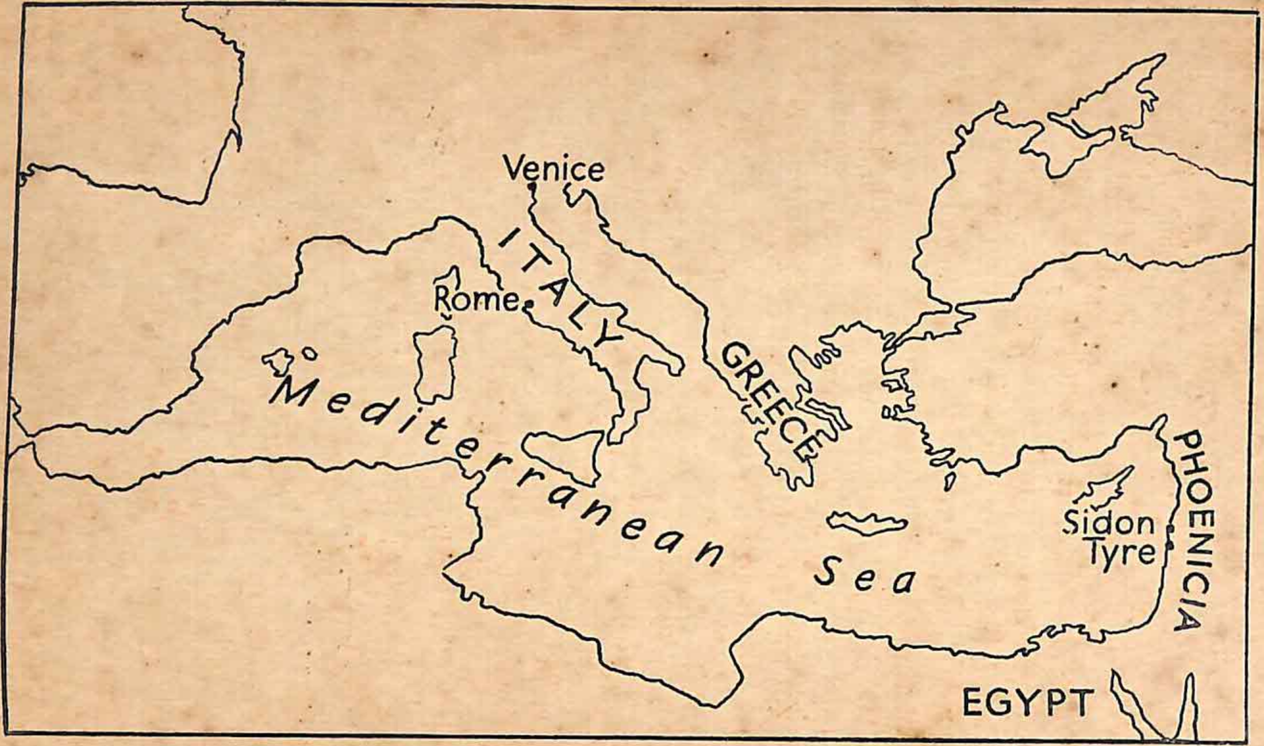
by

GWEN CROSS

THINGS WE USE

BOOK NINETEEN

LONGMANS


Venice
ITALY
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CHAPTER 1

GLASS

WHEN glass is cold, it is clear, hard and breaks easily. When it is hot, it is soft and bends easily. When it is very hot it is a sticky liquid. Some glass is transparent, some is opaque. An opaque thing is something we cannot see through.

We do not know when or where men first made glass. Men have found glass bottles and vases in Egypt that are 6,000 years old. These bottles and vases are beautifully made.

AN OLD VASE

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Phoenicians, Greeks and Romans made glass long ago. The Romans learnt to make glass from the Phoenicians. The men who made glass kept their trade a secret.

The most beautiful coloured glass in the world was made in Venice. The Venetians would have killed a glass-maker if he had told a man in another town how they made glass. Sometimes a man found a new way of making glass. Then he died before he had told any other man. This secret way of making glass was then lost. No one knows now how this beautiful, old glass was made.

The people in South Germany still make lovely glass. In their country they have all the things men need to make glass, a lot of clean, fine sand, soda, and coal to make very hot fires.

In England people began to put glass windows in their houses in the seventh century. The first glass windows were thick, rough and dark. The panes were very small.

Later men learnt to make very lovely glass windows. They coloured the glass and put little panes together to make pictures. There are many beautiful glass windows hundreds of years old in churches and cathedrals in England and Europe. Some of the loveliest glass windows are in Canterbury cathedral. Men take much care of these windows because they are more beautiful than any we can make now.

A CHURCH WINDOW MADE OF COLOURED GLASS

Years ago people often worked carefully with their hands for a long time to make one or a few beautiful things. These things cost much money. Now men make in a short time many things with machines. They are cheaper than the old things but many are not so beautiful.

THINGS TO DO

1. Trace a map of the Mediterranean Sea. Name these places: Rome, Venice, Italy, Tyre, Sidon, Phoenicia, Greece, Egypt.

2. Collect things that are made with glass. Write their names. Draw two of them.

QUESTIONS

1. Name two countries where glass was made long ago.

2. When did the English first make glass windows?

3. Which of these things are transparent and which are opaque:

a slate
paper
a pane of glass
a wooden door
a glass full of milk
a glass full of water

4. Name three things that are now made by machine that men once made with their hands.

A. Write the dates at the beginning and end of the seventh century.

In what centuries were these years?

353, 891, 1066, 1584, 1940.

B. The words pain and pane have the same sound but different spellings and meanings. Write one in each of these sentences:

The boy broke a . . . of glass.
The child had a . . . in its head.
Church windows have small . . . s of glass.

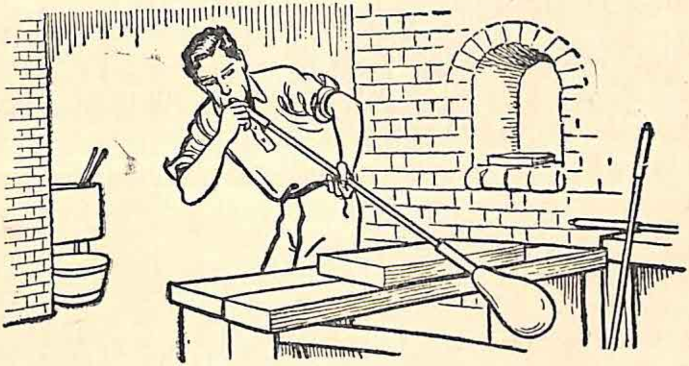
C. Write one word in place of each of these:

(*a*) The people who live in Venice.
(*b*) A hundred years.
(*c*) Something you cannot see through.
(*d*) Something you know but will not tell others.

CHAPTER 2

A PANE OF GLASS

GLASS is made with clean sand, soda, lime and other things. They are melted in a very hot fire. Until a few years ago men blew the hot glass to make different shapes at the end of a long blowpipe. Now men also blow glass with pumps and machines.

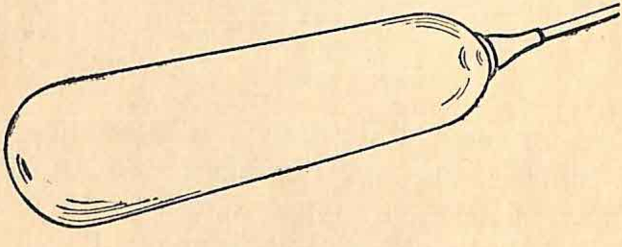


A MAN BLOWING GLASS

The things used for making glass are put in a very hot furnace. The coal that makes the fire burns with hot, long flames. The flames touch the sand. It melts and mixes with the other things. It makes a thick liquid. This is the hot glass. Dirt and scum float at the top. The hot glass flows away through a pipe at the bottom of the furnace to other tanks or machines.

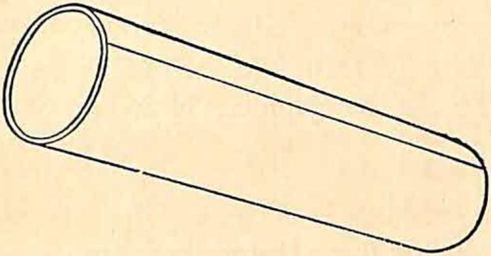
Men in glass factories do not wear many clothes because the furnace is very hot. Each man has a long, iron blow-pipe. He puts the end of it in the hot glass. He turns it round until a big red-hot lump of glass is hanging on the wide end of the blow-pipe.

When the lump is big enough he takes the blow-pipe from the hot glass to the side of a pit. He rests the blow-pipe on the edge of the pit. The lump of glass hangs in the pit. He fixes a pump to the blow-pipe and blows air into the lump of glass. This becomes a big, hollow ball. He pumps and turns the blow-pipe round to make a hollow cylinder of glass that is shut at each end. It is often more than two feet long and a foot wide.

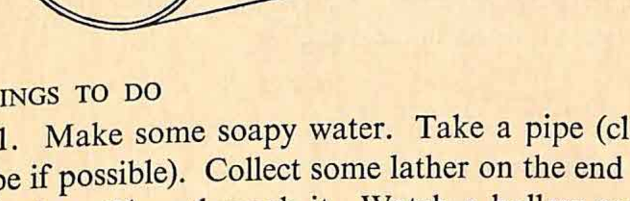


Another man takes the cylinder of glass from the end of the blow-pipe. He cuts off the two ends.

Then a man called a glass-cutter cuts a straight line on the cylinder from one end to the other.



He puts the glass cylinder in an oven. When it is hot it splits open at the place where the glass-cutter made the line. It opens and becomes nearly flat. Then a man takes it from the oven. It is rolled and polished. It makes a pane of transparent window glass.



THINGS TO DO

1. Make some soapy water. Take a pipe (clay pipe if possible). Collect some lather on the end of the pipe. Blow through it. Watch a hollow soap

bubble form on the pipe. This is how the glass-blower makes his hollow glass ball.

2. Take a piece of paper. Bend it in a circle. Stick the overlapping edges together. This makes an open cylinder. Cut two circles of paper. Fix one at each end of the cylinder. Now you have a shut cylinder.

QUESTIONS

1. Name three things that are mixed to make glass.
2. What work does the glass cutter do in making panes of glass?
3. Why is glass so cheap?
4. What is hot glass like?

A. Write down the names of all the shapes you know, e.g. circle, cube, ... Draw pictures of two of them.

B. Put the nouns in column A with the words about them in B.

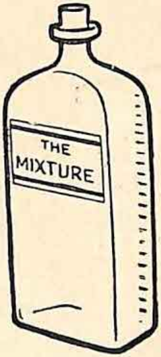
A	B
Iron	comes from a living plant.
Glass	is the heaviest of these things.
Oil	breaks easily.
Rubber	floats on water.

C. Read the last paragraph again. Say what happens to the glass cylinder in the oven.

CHAPTER 3

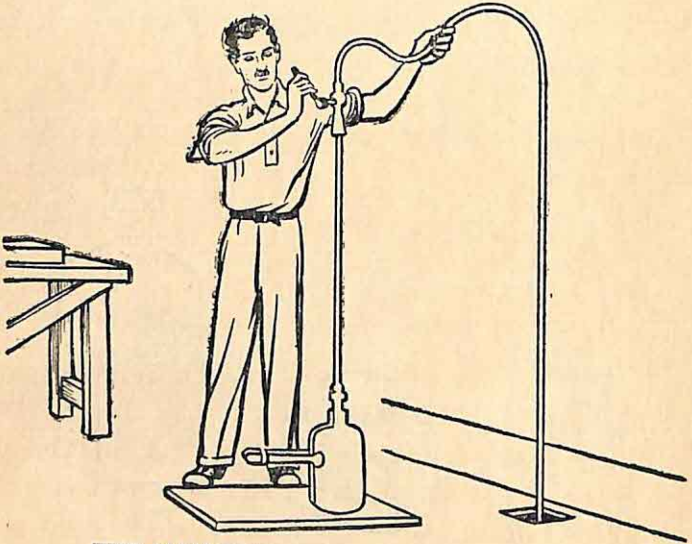
A GLASS BOTTLE

MILLIONS of glass bottles and jars are now made each year. We put medicines, foods, drinks and many other things into glass bottles. In a bottle factory the things for making glass are mixed together in a drum that turns round and round. Old broken bottles are also put into this mixture. Sometimes a brown, blue or green colour is also put into it. The hot glass flows from the furnace to the bottle-making machines. Some machines make 100,000 bottles in one day!



When men make bottles five men work together in a group. The first man collects the ball of hot glass on his blow-pipe through a hole in the side of the furnace. He rolls it on an iron table and blows it to make a hollow glass ball.

The second man puts this hollow ball into a mould. This is the shape of a bottle. He fixes a pump to the blow-pipe and pumps air into it. The glass takes the shape of the bottle mould. He opens the mould and gives the blow-pipe with the bottle hanging on it to the third man.



THE MAN PUMPS AIR INTO THE MOULD

This man hits the bottle with a piece of wet iron. It falls from the blow-pipe into a wooden tub. The bottle is still hot. He takes it up with tongs and gives it to the fourth man.

The neck of the bottle has a broken, rough edge. The fourth man makes the neck a good shape. He gives it a smooth, thick edge. The fifth man puts the bottle on a stone tray. The stone trays go through a tunnel that is hot at one end and cold at the other. The bottles are put in at the hot end.

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If they do not become cool slowly they will crack. When they arrive at the other end of the tunnel they are cold.

Men stand at the end of the tunnel. They look carefully at each bottle. A good bottle is sent to the packers. A bad bottle is sent back to the factory. It is broken and mixed with the other things to make new bottles.

THINGS TO DO

1. Take a bucket three-quarters full of water. Take two bottles. Fill one with water. Put the two bottles bottom downwards into water. What happens? Why does one float?

2. Collect bottles of different shapes and sizes. Draw two of them.

QUESTIONS

1. How many men work together in a group to make a bottle?
2. Which man has the hottest work to do?
3. Can broken glass be used again?
4. If a hot glass is put into cold water what happens?

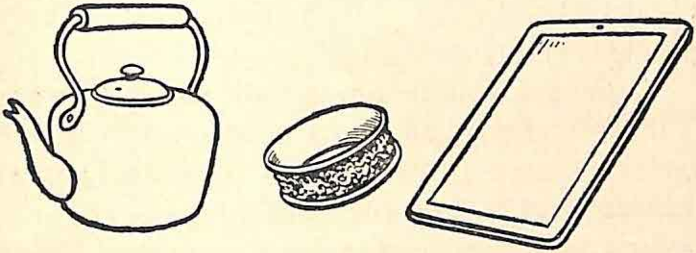
A. Find in a dictionary the three meanings of the word *mould*. Write a sentence using each one.

B. If a machine works in a glass factory from 8 in the morning until 6 in the evening, how many bottles will it make in an hour if it makes 100,000 in a day?

CHAPTER 4

PLASTICS

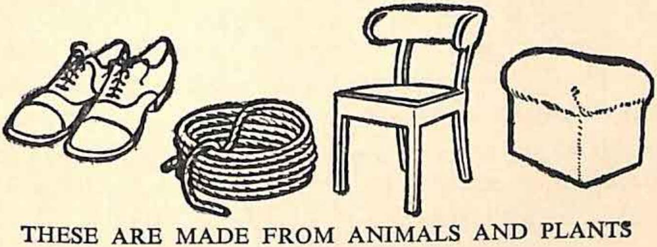
MEN have always made many of the things we use from things in the ground, or from parts of plants and animals. From the ground men get slate, and metals like gold, silver, copper, tin, iron and lead.



THESE ARE MADE FROM THINGS WHICH COME OUT OF THE GROUND

From animals and plants they get food and clothing, medicines, wood, rope and many other things.

Many of the plants men need for these things



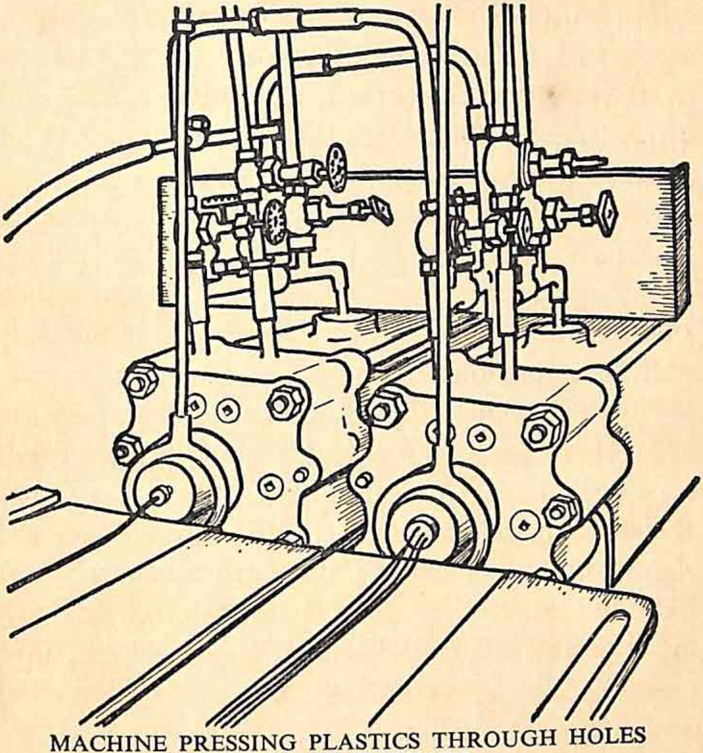
THESE ARE MADE FROM ANIMALS AND PLANTS

grow in hot countries. Ships carry bark, leaves, seeds and fruits to other lands. There men get from them food, oil, thread, etc. Quinine, soap and calico are all made in England from parts of plants that grow in the tropics.

Men are now learning to make from other materials the things they got before from plants. Many of these things belong to a group called plastics. Until a few years ago glass was the only plastic men made.

Plastics are thick liquids like glass when they are hot. They can be put into a mould, and they will take the shape of that mould. They keep that shape when they are cold as glass does. They are waterproof. Plastics are made from cheap things like sand, lime, salt, coal, oil and wood. Men now make tables, trays, chairs, lids, door handles, cups, plates, basins and parts of motor cars, ships and aeroplanes with plastics.

Some plastics can be pressed into very thin sheets. These can be cut and sewn together to make clothes. Other plastics can be pressed through a very small hole to make a long, fine, strong thread. This thread can be woven to make cloth, or it can be mixed with wool or cotton threads. It makes these materials stronger, but it does not make them warmer to wear.



MACHINE PRESSING PLASTICS THROUGH HOLES TO MAKE THREADS

Glass is now made into a long thread like this. It can be woven to make cloth and shoes! Many glass threads are put round water pipes in cold countries. They look like "cotton wool." Men are learning to make new plastics each year, and making new things with them. Everyone will want plastics that are cheap, pretty and strong.

THINGS TO DO

1. Melt some fat in a tin. Pour it into different shapes, e.g. a tin, a shallow basin, a bottle. Watch it take the shape of the thing it is in. What other things will "set" in the shape of a mould?

2. Collect any things that are made with plastics. Write their names. Draw two of them.

QUESTIONS

1. Name two foods, two medicines, and two kinds of clothes that are made from plants.

2. Write two things about a plastic.

3. What new things can now be made with glass?

4. What things in your schoolroom are made from things that have lived?

A. Write the things in this list under their right headings:

Headings: FURNITURE, PLASTICS, METALS, TOOLS.

Things: *table* *hammer* *shilling* *spade*
tank *chair* *glass bottle* *axe*
kettle *cupboard*

B. Read paragraph 5 again. Copy a sentence that tells you how plastic threads are made.

C. Copy the true sentences:

(*a*) Glass bends when it is hot.
(*b*) Very few things are made with plastics.
(*c*) Men dig quinine from the ground.
(*d*) Plastics are waterproof.

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You may find these words difficult. When you meet them in the book try to think out for yourself what they mean. If you cannot do this, ask your teacher for help.

Nouns

blow pipe
cylinder
mould
pane
plastic
secret

Adjectives

opaque
transparent

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